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ON SOME MEDUSÆ FROM AUSTRALIA.

BY ALEXANDER AGASSIZ AND ALFRED GOLDSBOROUGH MAYER.

WITH THREE PLATES.

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No. 2. — *On some Medusæ from Australia.* By ALEXANDER AGASSIZ AND ALFRED GOLDSBOROUGH MAYER.

THE medusæ described in the following paper were obtained while accompanying Mr. Agassiz during his recent visit to the Great Barrier Reef of Australia in April and May, 1896. Our course lay along the Queensland coast between the Great Barrier Reef and the mainland as far north as Lizard Island. Unfortunately, the season of the south-east Monsoon is far from favorable for collecting pelagic animals, as the winds blow a brisk gale almost incessantly and the water is much disturbed.

The few hauls of the surface net were all very similar, and brought to light large numbers of Sagittæ and Copepods, and a few Appendicularia, Doliolum, and Decapod larvæ. The only Cœlenterates found were several specimens of a Rhematodes, and a Mertensia. Two Discophoræ were found during our cruise. One of these is a new species, for which we propose the name *Desmonema rosea*, and the other is *Crambessa mosaica* Hæckel.

Desmonema rosea, nov. sp.

Plate I. Fig. 1.

The genus *Desmonema* was established by L. Agassiz.¹ It contains Cyaneidæ with eight sense organs, and numerous tentacles which are arranged in eight bunches arising from the sub-umbrella. The tentacles of each of these bunches are arranged, one after the other, in a single row. The margin of the bell possesses eight principal lappets and sixteen to thirty-two secondary lappets.

An oral view of *Desmonema rosea* is given in Plate I. Figure 1. The bell is rather flat, being about twice as broad as it is high. The eight primary lappets are separated from one another by deep clefts, which extend inwards for about a quarter of the distance from the margin of the bell towards the centre. There are thirty-two small, smoothly rounded, secondary lappets.

The eight marginal sense organs are sunken in long narrow niches lying in the oral floor of the sub-umbrella.

The tentacles are arranged in eight crescent-shaped rows, lying between and alternating with the eight primary lappets of the disk. There is but a single row of tentacles in each of these crescents.

¹ Agassiz, L., 1862; Contrib. to Nat. Hist. of U. S., Vol. IV. p. 166.
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The muscles of the oral surface of the disk are very conspicuous, and are arranged in sixteen bi-forked bundles, containing both circular and radial muscle fibres. The bundles lying adjacent to the tentacles are about twice as broad as those that lie near the sense organs.

The genital organs protrude from the oral surface of the disk as four complexly fimbriated sacs. The four oral fringes are very wide, and their free edges are sharply folded.

The general color of the substance of the disk is a delicate opalescent yellow, reminding one of the mediæval glass of Venice. The muscle system of the oral wall of the bell is of a delicate pink, as are also the genital organs. The oral fringes are of a most exquisite and delicate rose-color, and the entoderm of the tentacles is port-wine colored. The sense organs bear an intense orange pigment. The diameter of the disk is 180 mm. The medusa was found swimming in great numbers in Largs Bay, near Adelaide, South Australia, on May 29, 1896.

This species is similar in some respects to *Cyanea Muellierianthe*, that was described by Haacke¹ from the Gulf of St. Vincent. *C. Muellierianthe* is, however, smaller than *Desmonema rosea*; the shape of the marginal lappets and muscle bands is different, and, above all, there are several rows of tentacles in each crescent, instead of a single row, as is characteristic of the genus *Desmonema*. It also bears some resemblance to *Cyanea annaskala*, von Lendenfeld.²

Crambessa mosaica Haeckel.

Plates II. and III.

- Cephea mosaica* Quoy et Gaimard, 1824; Voyage de l'Uranie, Zoologie, p. 569, Plate 85, Fig. 3.
- Rhizostoma mosaica* F. Eescholtz, 1829; System der Acalephen, p. 53. T. H. Huxley, 1849; Phil. Trans. Roy. Soc., pp. 422, 432, Plate 38 (Figs. 26, 27), Plate 39 (Figs. 28-34).
- Catostylus mosaicus* L. Agassiz, 1862; Contrib. to Nat. Hist. of U. S., Vol. IV. p. 152. Grenacher und Noll, 1876; Abhandl. Senckenberg. Ges., Bd. X. p. 38.
- Catostylus Wilkesii* L. Agassiz, 1862; Contrib. to Nat. Hist. of U. S., Vol. IV. p. 152.
- Crambessa mosaica* E. Haeckel, 1879; Das System der Medusen, p. 622. R. von Lendenfeld, 1883; Zeitschrift für Wissen. Zool., Bd. XXXVIII. p. 635. R. von Lendenfeld, 1884; Proc. Linn. Soc. New South Wales, Vol. IX. Part II. p. 299. R. von Lendenfeld, 1884; Proc. Linn. Soc. New South Wales, Vol. IX. p. 926; Medusæ of the Australian Seas, Part I. p. 30, Sydney, 1887. Zeit. für Wissen. Zool., 1888, Bd. XLVII. Heft 2, pp. 213, 231-242, Pls. 19, 21, 23-27.

Although so much has been written concerning the anatomy and histology of this medusa, no figure of it has as yet been given, if we except the sketch by Quoy and Gaimard in the Voyage de l'Uranie, Plate 85, Fig. 3. We there-

¹ Haacke, W., 1887; Jenaische Zeitschrift, Bd. XX. pp. 605-614, Plate 36.

² R. von Lendenfeld, 1882; Zeit. Wiss. Zool., Bd. 37, p. 465, Pl. 27-33.

fore give a figure on Plate II., and a few details of its structure on Plate III., and also a brief description of the Medusa.

When fully expanded the bell is rather flat, being five or six times as broad as it is high. The aboral surface is thickly covered with small granular papillæ, which give it a roughened appearance. The marginal lappets are very numerous, and their number is not very constant, but there are usually 16 between each pair of sense organs, and as there are 8 sense organs, it would seem that the normal number of lappets is 128.

An aboral view of one of the marginal sense organs is given in Figure 3, Plate III. An excellent figure of a longitudinal section has been given by von Lendenfeld ('88, p. 269, Fig. 66).

Four thick pillars extend downwards from the ventral surface of the bell, and support the brachial disk, or subgenital porticus, as it is often called. The brachial disk, in turn, bears the eight mouth-arms (von Lendenfeld, '88, p. 239, Taf. 19, Fig. 10). A drawing of one of these mouth-arms is given in Figure 5, Plate III.; and it is lettered to correspond with von Lendenfeld's Figure 36, Plate 23. The short, simple, upper portion of the arm is indicated by *e*, and *a*, *b*, and *d* show the three wings of the lower arm; *a* being ventral, and *b* and *d* dorsal. A cross section of the lower portion of the arm taken at niveau *ss*, Figure 5, is given in Figure 6. Its lettering is similar to that of Figure 5. A view of the terminal portion of one of the mouth-arms showing the suctorial mouths, surrounded by double rows of small tentacles, is given in Figure 4. In life these tentacles keep in incessant motion, and by this means small particles of food are swept into the numerous suctorial mouths which open at intervals between the rows of tentacles. Good descriptions of the mouth-arms will be found in the papers of Grenacher and Noll ('76),¹ and of Hamann ('82).²

The color of this medusa is normally cobalt-blue, but, as was discovered by von Lendenfeld ('84, p. 925), a species of *Zoöxanthella* commonly infests it, forming dense clusters throughout the jelly; and when this is the case the blue color is lost, and the medusa changes to a brown color, varying from that of white bread to that of coffee. Our figure (Plate II.) shows one of these infested medusæ, and it will be seen that the only trace of the normal color is found in a faint blue line marking the uppermost regions of the suctorial mouths of the mouth-arms. In the estuary of the Brisbane River on May 21 we saw a great number of these medusæ nearly every one of which was of a deep cobalt-blue, while now and then one was seen almost white in color, and still others showed intermediate stages between the deep blue and the white. We found the white or slightly brownish medusæ in the Hawkesbury River near Sydney on April 4; in the harbor of Cairns, Queensland, April 27; and in the Brisbane River, May 21. We also found a small dark brown or coffee-colored

¹ H. Grenacher und F. C. Noll, 1876; *Abhand. d. Senckenberg. Naturf. Gesell.*, Vol. X. p. 146, Plates I., III.-VII.

² O. Hamann, 1882; *Jen. Zeit. für Naturwis.*, Vol. XV. pp. 243-285, 3 Plates.

specimen at Lark Opening, near Cooktown, Queensland, on May 4. The medusa has been found by von Lendenfeld in the harbors of Sydney and Melbourne. In Melbourne Harbor the specimens are blue, while in Sydney they are universally brown or coffee-colored (von Lendenfeld, '88, p. 241). The medusa is evidently common all along the eastern coast of Australia, where it congregates in large numbers in the harbors and brackish estuaries.

Von Lendenfeld found a small species of fish, *Trichiurus declivis* Jenyns, in "symbiosis" with the medusa in Sydney Harbor. We found the same species accompanying the medusæ collected in Cairns Harbor, Queensland.

The diameter of the disk of full grown medusæ is about 250 mm.

EXPLANATION OF THE PLATES.

PLATE I.

Fig. 1. *Desmonema rosea*; oral view ; $\frac{1}{2}$ natural size.

PLATE II.

Fig. 2. Side view of *Crambessa mosaica* ; $\frac{2}{3}$ natural size.

PLATE III.

Crambessa mosaica.

Fig. 3. Aboral view of marginal sense organ.

Fig. 4. Side view of the terminal portion of one of the mouth-arms, highly magnified, showing the suctorial mouths and the furrows bordered by rows of tentacles.

Fig. 5. Side view of a mouth-arm.

Fig. 6. Cross section of one of the mouth-arms.